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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,232	12/21/2001	Ghulam Hasnain	10001379-1	8798

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EXAMINER
MONBLEAU, DAVIENNE N

ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 03/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,232	HASNAIN ET AL.	
	Examiner	Art Unit	
	Davienne Monbleau	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

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Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Mendez et al. (U.S. Patent No. 5,079,774). Regarding Claims 1 and 7, Mendez et al. disclose in Figure 2B an optical semiconductor device (30) comprising an active layer (36) and a plurality of semiconductor layers including a n-p junction (see column 5 lines 35-39). The Applicant discloses in the specification on page 3 lines 27-33 that said active layer has a polarization field and wherein a reverse bias tunnel diode may provide the desire orientation. Mendez et al. further discloses in column 5 lines 40-42 that the junction is "reversed biased" to provide an electric field of sufficient magnitude to switch the polarization of the output radiation. This process is dependent upon the characterization of the orientation of said active layer.

Regarding Claims 2 and 8, the Applicant discloses in the specification on page 1 lines 28-30 that GaN semiconductor lasers are known in the art.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendez et al. (U.S. Patent No. 5,079,774). Regarding Claim 4, Mendez et al. do not teach a reversed c-axis GaN base layer. The Applicant teaches in the specification on page 1 lines 28-30 that GaN semiconductor lasers are known in the art. This includes GaN base/substrate layers. Each crystal inherently has a c-axis and determining the optimum orientation of the crystal on which to grow the semiconductor layers involves routine skill in the art.

Regarding Claim 5, molecular beam epitaxial deposition is a known method in the art of growing crystals for semiconductor devices.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mendez et al. (U.S. Patent No. 5,079,774), as applied to Claim 1 above, and further in view of Holonyak, Jr. (U.S. Patent No. 6,369,403). Regarding Claim 3, Mendez et al. do not teach a reverse biased tunnel diode. Holonyak, Jr. teaches in Figure 1 a semiconductor device comprising a tunnel junction (125) and further teaches in Claim 19 that said junction is reverse biased. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a tunnel

junction in Mendez et al., as taught by Holonyak, Jr., to facilitate the transferring of electrons through the diode for more efficient output.

Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendez et al. (U.S. Patent No. 5,079,774), as applied to Claims 1 and 7 respectively, and further in view of Anayama et al. (U.S. Patent No. 5,799,027). Mendez et al. do not teach an angled active layer. Anayama et al. teach in Figure 1 a semiconductor device comprising an angled substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an angled active layer in Mendez et al., as taught by Anayama et al., to confine light in both the perpendicular and lateral directions. (see Anayama et al. column 2 lines 1-5).

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mendez et al. (U.S. Patent No. 5,079,774), as applied to Claim 7 above, and further in view of Smith et al. ("Determination of wurtzite GaN...". Mendez et al. do not teach the specific growing method of a GaN seed layer. However, GaN is characterized by a wurtzite crystal structure. Smith et al. teach in the abstract the properties of the Ga side of the crystal and the N side of the crystal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine optimum side of the crystal (normal or reversed) on which to grow the semiconductor layers. The technique of growing a layer of semiconductor material on a substrate is known in the art.

Regarding Claim 10, molecular beam epitaxial deposition is a known method in the art of growing crystals for semiconductor devices.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Major et al. (6,100,546), Morita et al. (6,501,154), Brandle, Jr. et al.(5,530,267), Van de Walle et al. (5,383,211), Jewell et al. (5,331,654), Pamulapati et al. (5,953,362), Konushi et al. (5,070,510), Wang et al. ("Piezoelectric Effect ..."), Ramachandran et al.("Inversion of wurtzite..."), Yeo et al. ("Effect of the (1010)...").

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Davienne Monbleau whose telephone number is 703-306-5803. The examiner can normally be reached on Mon-Fri 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on 703-308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Davienne Monbleau

DNM
March 23, 2003

Paul Ip

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